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VARIANCE IN HERBARIUM SPECIMEN IDENTIFICATION AND OTHER CONSIDERATIONS BASED UPON THE PREPARATION OF A LOCAL FLORA

ROBERT A. DAVIDSON AND PHYLLIS E. DAVIDSON

"A universal, to Aristotle, is any common noun, any name capable of universal application to the members of a class: so *animal, man, book, tree,* are universals. But these universals are subjective notions, not tangibly objective realities; they are *nomina* (names), not *res* (things); all that exists outside us is a world of individual and specific objects, not of generic and universal things; men exist, and trees, and animals; but man-in-general, or the universal man, does not exist, except in thought; he is a handy mental abstraction, not an external presence or re-ality" (Durant, 1953).

Some 2200 years after Aristotle, Gleason (1933) reflected: "It is now generally recognized that a species is an abstract mental concept. . . . To this concept is given a binominal name. . . . The assignment of the individual to a certain concept constitutes identification. . . . The name which appears on a herbarium sheet represents the opinion of some person." Gleason also has pointed out that specific concepts vary through accumulation of study material and through changed mental attitudes and emphasizes that, ". . . the probability that a specimen is correctly identified, that is, that it correctly illustrates a certain specific concept, depends largely on the person making the identification and on the date when it was made."

The foregoing comments are intended to serve as an initial warning that the data to follow, though objective in appear-

ance, are at least partially quite subjective. Yet, since few would disagree that the boundaries of most present-day-recognized species are ". . . real, objective phenomena" (Stebbins, 1950), the data presented here may be of some interest.

In 1952 work was begun which culminated in a survey of the vascular flora of 16 counties of southeastern Iowa (Davidson, 1957). The field work done in this connection encompassed at least parts of four growing seasons during which some 15,000 miles were traveled, innumerable notes taken, and some 4,400 collections, totaling an estimated 9,000 individual specimens, made. In identifying these specimens[1] every effort was made to check as carefully as possible identifications of all specimens collected previously from southeast Iowa and deposited in the Herbarium of the State University of Iowa (IA). Eventually similar consideration was given to all southeast Iowa species included neither in the new collections not at IA but represented in the herbaria of Iowa State University, Parsons College, and Iowa Wesleyan College. A few critical specimens were examined at the Barnes' Herbarium of the Davenport Public Museum. For the most part, however, the data cited bear upon representatives of the flora of southeast Iowa on deposit at IA.

This herbarium houses some 125,000 vascular plants. Curated in the past by B. S. Shimek, L. M. Cavanaugh, W. A. Anderson, and currently by R. F. Thorne, the permanent collection at the time of the study was in good condition; nevertheless, special care was taken during the investigation to discard or ignore fragmentary material which *per se* would be subject to non-reliable identification. Student collections, other than those associated with formal graduate-level research, have not been incorporated into the permanent collection and almost without exception specimens and their identifications reflect the field work and opinions of experienced taxonomists.

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[1]Recent regional manuals (Fernald, 1950; Gleason, 1952), monographs and revisions, and other appropriate literature were consulted in identifying materials, in the application of names, and in the compilation of synonymy. In a few cases deviations from the literature were necessary to express other taxonomic opinions.

Reporting the data presented here is possible due to an earlier belief that differences in opinion regarding the correct identity of herbarium specimens might relate to certain evolutionary considerations. When idealized this reasoning would run something like this:

1. In a given area, species which are clearly defined and not associated with close relatives nor subject to introgression, etc., are subject to greater unanimity of opinion regarding their identity than are species for which there are close relatives or between which introgression, hybridization, intergradation, etc., occur.
2. "Misidentification"[2] thus is more closely associated with "critical" taxonomic groups than with "non-critical" groups.
3. Critical groups are more often closely associated with recent and current evolutionary flux than with old evolutionary stability.
4. Misidentification is thus related to evolution and perhaps to evolutionary stage.

The idealized "logical" conclusion follows that, *e. g.*, if we detected 20% misidentifications within the family Compositae amongst 50 genera including 200 species while we found only 5% misidentifications within the family Leguminosae amongst 50 genera and 200 species, we might assume that the Compositae is (at least as represented in a given area) in a stage of greater evolutionary flux than is the Leguminosae.

It seems apparent, however, that such a scheme would be feasible only if numerous qualifications were made and if large floristic segments were studied within the framework of a taxonomy much more refined than that with which we now work. In any event, rather vague thinking along the preceding lines caused accurate records to be kept on each herbarium specimen considered to be misidentified. These records may be summarized as follows:

A total of 1252 species, comprising 507 genera and 124 families, currently are known to occur in southeast Iowa.

Of these, 1148 were already represented in the herbaria consulted by the time the senior author's field work was initiated. Thus this more recent field work, resulting in the

[2]"Misidentification" is used for simplicity throughout this paper to mean: "difference in opinion regarding the identity of. . ." Thus a misidentification was scored each time one of us (R.A.D.) disagreed with the label identification, or the latest annotation, of a herbarium specimen.

collection of 4435 numbers, increased the number of species comprising the flora of southeast Iowa previously uncollected in the area by 8.3%. One unrecorded species was collected for each 42.3 collection numbers. Said in another way, 2.3% of the new collections represented species previously unknown to the area.

Of the 3997 herbarium specimens examined, 184 (or 4.6%) were considered misidentified (this number does not include approximately 35 specimens considered to be putative hybrids). Upon correction these 184 specimens were included in the 507 specimens which represented the 139 species for which misidentified specimens were found. By relating the latter figure to the 1148 species represented in the herbaria we can calculate that 12.1% of all species was falsely represented by at least one herbarium specimen. This figure is of some importance inasmuch as the speed and clarity with which one arrives to a given species concept depends in large part upon the examination of a series of correctly identified specimens.

Before re-identification, the 184 misidentified specimens allegedly represented 60 species (synonymy taken into account here as elsewhere) not currently known to be present in southeast Iowa. Thus, for the segment studied, the herbarium was 4.8% richer in species than it should have been. It is suspected that this trend may reflect the taxonomists' "unconscious" desire to find rarities.

On the other hand, the 184 misidentified specimens when re-identified accounted for 21 species which are currently represented by one or more formerly misidentified specimens only. In other words, 21 species now considered validly present in the flora of southeast Iowa were neither represented in the herbarium before the present study nor collected during it. Thus some 1.7% of the total flora was hidden in the herbarium through misidentification.

Table 1 lists all families represented by 20 or more herbarium specimens, giving the included number of genera, species, specimens, misidentified specimens, and the percentage of misidentification. Few, if any, generalizations on the

TABLE 1. DATA ON PLANT FAMILIES REPRESENTED BY TWENTY OR MORE HERBARIUM SPECIMENS

Family	Number Genera	Number Species	Total Speci-mens	"Misiden-tified"	Percent "Mis-identified"
Equisetaceae	1	4	24	0	0
Aspidiaceae	8	15	68	0	0
Potamogetonaceae	1	11	31	2	6.4
Gramineae	51	118	441	36	8.1
Cyperaceae	9	72	178	10	5.6
Araceae	3	4	22	0	0
Commelinaceae	2	4	23	0	0
Juncaceae	2	11	23	6	26.0
Liliaceae	10	22	62	0	0
Salicaceae	2	16	64	1	1.5
Betulaceae	4	4	36	1	2.7
Fagaceae	1	9	73	0	0
Polygonaceae	4	27	84	4	4.7
Chenopodiaceae	3	12	24	4	16.6
Amaranthaceae	3	10	36	1	2.7
Caryophyllaceae	8	16	45	0	0
Ranunculaceae	12	28	133	0	0
Papaveraceae	4	7	23	1	4.3
Cruciferae	16	32	62	8	12.9
Saxifragaceae	6	9	29	0	0
Rosaceae	4	41	143	15	10.4
Leguminosae	28	55	215	3	1.3
Rutaceae	2	2	22	0	0
Polygalaceae	1	5	24	0	0
Euphorbiaceae	3	19	57	0	0
Anacardiaceae	1	4	41	0	0
Vitaceae	3	6	25	1	4.0
Malvaceae	6	7	20	0	0
Guttiferae	1	9	28	3	10.7
Violaceae	1	16	58	17	29.3
Onagraceae	5	12	39	0	0
Umbelliferae	17	23	49	6	12.2
Primulaceae	3	8	29	1	3.4
Asclepiadaceae	2	12	21	0	0
Convolvulaceae	3	14	36	4	11.1
Boraginaceae	7	11	37	0	0
Verbenaceae	2	6	42	0	0
Labiatae	20	40	161	13	8.0
Solanaceae	5	12	40	2	5.0
Scrophulariaceae	19	39	162	0	0
Acanthaceae	2	3	21	0	0

Plantaginaceae	1	7	22	0	0
Rubiaceae	3	8	42	2	4.7
Caprifoliaceae	6	12	40	1	2.5
Campanulaceae	3	7	39	1	2.5
Compositae	52	153	509	32	6.2

cause of misidentification are discernable with any degree of certainty. The quality of misidentifications ranged from genera mistaken for other genera (e. g., *Anthemis* for *Matricaria*, *Crepis* for *Pyrrhopappus*, *Eragrostis* for *Leptoloma*, *Pontederia* for *Heteranthera*, *Thaspium* for *Pastinaca*, etc.) to "closely related species" being confused (e. g., *Mentha* spp., *Viola* spp., *Muhlenbergia* spp., etc.). The relative technicality of the taxonomy of a given group may or may not be important (at any rate, any attempt to isolate this as a single factor probably would be futile). The Euphorbiaceae, a rather technical group with few critical species (*Euphorbia heterophylla* L. and *E. dentata* Michx. being notable exceptions), was represented by 57 specimens all correctly identified. On the other hand approximately 12% of the 49 specimens representing the Umbelliferae, also technical but with few critical species noted, was misidentified. The Cyperaceae, at once quite technical and apparently including many taxonomic problems, was represented by 178 specimens of which only 5.6% was misidentified (the figure quite close to the 4.6% "Grand 'Misidentification' Average" for the entire herbarium segment studied). In the Gramineae, similarly technical and also with several critical species complexes, misidentifications were found in 8.1% of the 441 representative specimens. The Juncaceae, technical, but with few taxonomic problems encountered, was represented by 23 specimens of which 26% was misidentified. The taxonomy of the Chenopodiaceae and Amaranthaceae might be considered more or less equally technical, but of the two families species of the Amaranthaceae seem generally less well defined; yet of 24 chenopodiaceous specimens 16.6% was misidentified while of 36 amaranthaceous specimens only 2.7% was misidentified. Less technical, but with several outstandingly difficult genera, the Rosaceae bore a misidentification figure of 10.4%. The large misidentification

percentage for the Violaceae (29.3% of 58 specimens) probably reflects the biological complexity (introgression, etc.) of *Viola* and concomitant difficulties in its taxonomic interpretation plus intensive recent work on the group.[3] The surprising low misidentification percentages given for the Salicaceae and Fagaceae, both apparently containing biologically complex entities, are probably best accounted for by the fact that many specimens considered uninterpretable were not included in the tally as neither were specimens considered putative hybrids.

The number of families (some, e. g., the Scrophulariaceae and Ranunculaceae, represented by relatively large numbers of specimens) for which no misidentifications were detected seems surprisingly large.

It should be re-emphasized that the "facts" and "figures" presented here are, actually, only quasi-facts and -figures. Without qualifications they are not strictly appropriate for mathematical manipulations; with the qualifications that are indicated they seem even less so. These qualifications are of a compounding nature with each seriously affecting the others. In the first place, are the species under consideration actually real with objective, definable limits? Probably most are while some are not — what is the percentage of each in the total flora? How much error is the result of carelessness? For those species that are real, how adequate has been their perception, and how adequately have these perceptions been set to the language of keys, descriptions, etc? How uniformly do various taxonomists interpret this language (which as Gleason, *op. cit.*, has pointed out changes with time) and how much more, or less, accurate are recent identifications than preceding ones? These are just a few of the questions that come to mind.

Probably very little of significance can be deduced from this minor side-study. However, an attempt has been made to indicate some of the effects of recent field work on the known flora of a given sector and to quantitate differences of opinion regarding the composition of this flora. — DEPT. OF BOTANY, UNIVERSITY OF WISCONSIN, MADISON, WISCONSIN.

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[3]Specimens were examined and annotated by Dr. Norman H. Russell.

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A NEW ZEPHYRANTHES FROM SOUTHERN TEXAS

FRED B. JONES

Zephyranthes refugiensis *sp. nov.* Bulbus subglobosus 2-2.7 cm. diam.; folia linearia; ad basim 2-3 mm. lat., usque ad 25 cm. long.; pedunculus 15-23 cm. alt.; spatha 2.2-2.8 cm. long. integra, fenestrata aut bifida, dimidio inferiore tubulari; pedicellus 8-16 mm. long.; perianthus erectus, tubo 1.5-2.4 cm. long., viridi; segmenta perianthi oblanceolata ad lanceolata, flava; stylus erectus, antheras attingens; stigma album breviter trilobatum.

Bulb subglobose, 2-2.7 cm. wide x 1.7-2.3 cm. high, tunics dark brown; neck 4-5 cm. long; leaves linear, 2-3 mm. wide at base, to 25 cm. long, grayish green, channelled on upper side, convex on lower side, apex subacute to rounded; peduncle 15-23 cm. high, 3-4 mm. wide at base, 2-3 mm. wide at apex, round to slightly flattened, one-flowered; spathe membranous, 2.2-2.8 cm. long, entire, fenestrate or bifid, the lower half tubular, purplish; pedicel 8-16 mm. long; ovary 4-6 mm. long, 3-4 mm. wide; perianth erect, 3.4-4.5 cm. long, the limb funnelform; perianth tube 1.5-2.4 cm. long, 2-3 mm. wide at base, 3-4 mm. wide at apex, yellowish green; perianth segments oblanceolate to lanceolate, yellow (Wilson, 2-3), greenish at base, often flushed with red on outside; petaline segments 20-28 mm. long, 7-11 mm. wide; sepaline segments approximately as long but usually 1 mm. wider; filaments inserted at the throat of the perianth tube, suberect, somewhat flattened, light greenish yellow; sepaline filaments 7-10 mm. long, petaline filaments usually 1 mm. longer; anthers versatile, suberect, affixed much below the middle, 8-10 mm. long at anthesis, the pollen orange-yellow; style erect, greenish below, white in the upper part, reaching apexes of filaments or even of anthers; stigma shortly three-lobed, white; capsule deeply three-lobed; seeds D-shaped, 5-6 mm. long, black.

FIGURE I. Photomicrograph (X1500) of the somatic chromosome complement of *Zephyranthes refugiensis* (2n = 48) from a colchicine-treated root tip squashed in 2% acetic orcein. Arrows indicate two of the chromosome types readily distinguishing *Z. refugiensis* from *Z. pulchella*. (Courtesy of R. O. Flagg, The Blandy Experimental Farm, Boyce, Va.)

TYPE: 1½ miles east of Refugio, Refugio County, Texas, Fred B. Jones 4353, Oct. 26, 1960, Welder Wildlife Foundation Herbarium (isotypes to be distributed).

The usual habitat of *Z. refugiensis* is an open swale, either in a brushy pasture or on prairie. The soil preference appears to be a tight sandy loam. Flowering occurs five to ten days after a heavy shower, at which time water to a depth of several inches is likely to be standing over the bulbs. A flush of bloom follows each substantial rain from July to November. Other rain lilies which may be present in the swales and come into flower at the same time as *Z. refugiensis* are *Z. pulchella, Cooperia Drummondii, C. Jonesii, C. Traubii* and *Habranthus texanus.*

Z. refugiensis is readily distinguished from *Z. pulchella*, to which it seems to have a close affinity, by the longer perianth tube. The lighter yellow perianth and decided fragrance are also distinctive characteristics. Flagg (Fig. 1) reports that the plant differs cytologically from *Z. pulchella.*

As presently known, the species is limited to northern and eastern Refugio County and a small adjoining area in Goliad County.[1] — WELDER WILDLIFE FOUNDATION, SINTON, TEXAS.

MERGER OF THE NORTH AMERICAN HOUSTONIA AND OLDENLANDIA UNDER HEDYOTIS*

WALTER H. LEWIS

Principally on the basis of seed, and to a lesser extent floral and fruit characteristics, the genera *Houstonia* L. and *Oldenlandia* L. are distinguished. A comparative study of these features for the North American species and, where possible, for the African *Oldenlandia* is presented using the following outline.

[1]For making available the collections of rain lilies on deposit in their respective herbaria, I am grateful to the following: Dr. B. L. Turner, Herbarium of the University of Texas; Dr. F. W. Gould, Tracy Herbarium of A. & M. College of Texas; Dr. Lloyd Shinners, Herbarium of Southern Methodist University.

Dr. Hanna Croasdale kindly prepared the Latin diagnosis.

*This study was supported by a grant from the National Science Foundation G-9800.

Subg. HOUSTONIA[2] — *seeds* few, large, dorsiventrally flattened, crater-form to concavo-convex, with or occasionally without hilar ridge, endosperm corneous; *capsules* one-fourth to three-fourths inferior; *flowers* often dimorphic, corolla elongate.

Subg. OLDENLANDIA — *seeds* numerous, minute, angled, rarely subglobose, endosperm fleshy; *capsules* wholly inferior; *flowers* usually monomorphic, corolla short.

These criteria are largely from the keys and descriptions of Gray (1860), Wernham (1916), Standley (1918), and Fernald (1950).

SEED. A majority of the subg. *Houstonia* species have averages of 10-15 seeds per capsule. However, Rose (1890) reported ca. 40 seeds for *H. brevipes* (Rose) W. H. Lewis, Terrell (1959) recorded up to 35 seeds in the *H. purpurea* (L.) T. & G. complex, and to these are added averages of 30 seeds for the capsules of *H. arenaria* (Rose) W. H. Lewis and 50-60 for those of *H. asperuloides* Benth. Most subg. *Oldenlandia* species average over 50 seeds per capsule, excepting *H. microtheca* (S. & C.) Steud. and *H. watsonii* W. H. Lewis from Mexico, with 20 and 30 seeds, respectively. The African *Oldenlandia* subg. *Orophilum* Brem. with 9 species and the questionable segregate *Lelya* Brem. are described as few-seeded (Bremekamp, 1952). These examples illustrate a continuous and often overlapping range for seed frequency in the two subgenera.

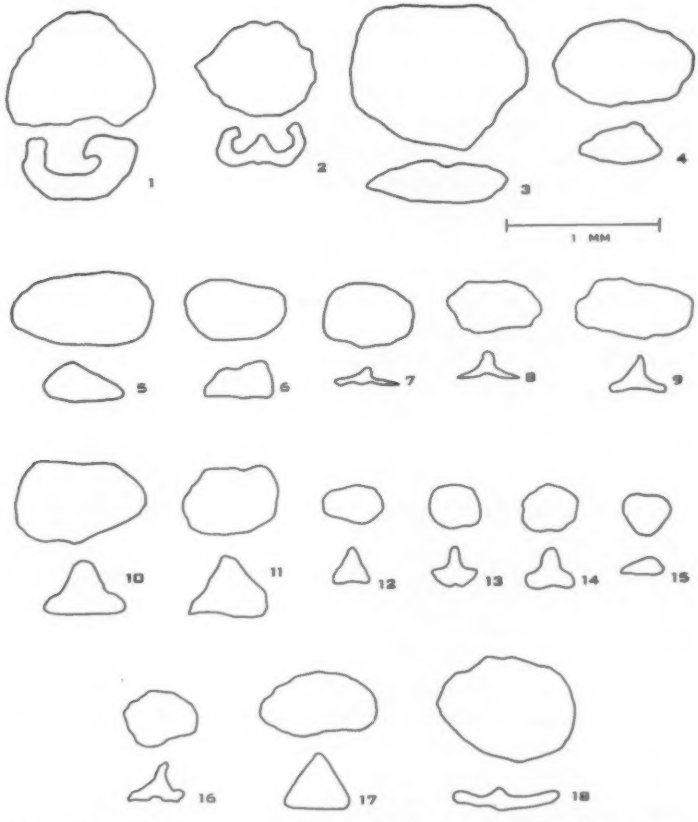
The typical seeds of 18 species of subg. *Houstonia* and subg. *Oldenlandia* are outlined in figures 1-18. The usual subg. *Oldenlandia* seed is small, e.g., *H. corymbosa* (L.) Lam. (fig. 12, 0.24 x 0.4 mm.), but this varies to the larger seeds of *H. greenei* (Gray) W. H. Lewis (fig. 17, 0.41 x 0.71 mm.) and *H. microtheca* (fig. 18, 0.65 x 0.90 mm.). These seeds are about the same size or even larger than those of *H.* (*Houstonia*) *asperuloides*, *H. saxatilis* W. H. Lewis, *H. peninsularis* (Brandg.) W. H. Lewis, *H. arenaria*, *H. gracilenta* (I. M. Johnst.) W. H. Lewis, *H. umbratilis* (Robins.) W. H.

[2]The North American *Houstonia* and *Oldenlandia* are discussed at the rank of subgenus so that the accepted nomenclature for *Hedyotis* can be used. Only one of the Afro-Asian species used in evidence here has been transferred to *Hedyotis*. Because a detailed study of the more numerous Old World species was not attempted, a change in nomenclature at this time is premature and all species and the subg. *Orophilum* Brem. are retained under *Oldenlandia*.

Lewis (fig. 6-11), and several additional species not illustrated. Although the seeds of subg. *Houstonia* tend to be larger than those of subg. *Oldenlandia*, a discontinuity in size does not exist.

The species of subg. *Houstonia* are described as having dorsiventrally flattened seeds with distinct craters varying to concavo-convex and with hilar ridges on the ventral face. Near median sections of *H. crassifolia* Raf. and *H. wrightii* (Gray) Fosb. seeds are typical representatives (fig. 1-2). Those of subg. *Oldenlandia* do not have seeds dorsiventrally flattened, craterformed, concavo-convex, nor ventrally ridged, but rather they are angular or more rarely subglobose (fig. 12-14). These descriptions, however, are not always applicable. The seeds of *H.* (*Houstonia*) *mullerae* Fosb. (fig. 4), *H. brevipes* (fig. 5), and *H. asperuloides* (fig. 6) are not strongly dorsiventrally flattened, but are ± angular; those of *H. arenaria* (fig. 9), *H. gracilenta* (fig. 10), and *H. umbratilis* (fig. 11) are angular. None are craterform and all lack hilar ridges. An intermediate seed type with only a shallow ventral groove may be noted for *H. serpyllacea* Schl. (fig. 3). On the other hand, the ± dorsiventrally flattened seeds of *H.* (*Oldenlandia*) *callitrichoides* (Griseb.) W. H. Lewis (fig. 15) and the concavo-convex seeds of *H. microtheca* (fig. 18) with hilar ridges hardly match the characteristics of the subg. *Oldenlandia*. Such variability is not restricted to the American species, for the African *O. divaricata* Engl., *O. benguillensis* Hiern, *O. luzuloides* Schum., and *O. micrantha* Chiov., all possess dorsiventrally flattened seeds.

It is unfortunate that, in the Rubiaceae, there are a number of characters in general use which, for practical taxonomic purposes, are difficult to utilize (Verdcourt, 1958). Among these I include the endosperm of small seeds. Most species of subg. *Houstonia* have corneous endosperms, but among the exceptions are *H. arenaria*, *H. saxatilis*, and *H. brevipes*, whose endosperms are decidedly fleshy. Those of *H. (Houstonia) gracilenta* and *H. (Oldenlandia) callitrichoides* are intermediate in texture, while the seeds of *H. mi-*



Figs. 1-18. Outlines and near median sections of *Hedyotis* seeds, Figs. 1-11 subg. *Houstonia*, Figs. 12-18 subg. *Oldenlandia*. Fig. 1. *H. crassifolia* Raf.; fig. 2. *H. wrightii* (Gray) Fosb.; fig. 3. *H. serpyllacea* Schl.; fig. 4. *H. mullerae* Fosb.; fig. 5. *H. brevipes* (Rose) W. H. Lewis; fig. 6. *H. asperuloides* Benth.; fig. 7. *H. saxatilis* W. H. Lewis; fig. 8. *H. peninsularis* (Brandg.) W. H. Lewis; fig. 9. *H. arenaria* (Rose) W. H. Lewis; fig. 10. *H. gracilenta* (I. M. Johnst.) W. H. Lewis; fig. 11. *H. umbratilis* (Robins.) W. H. Lewis; fig. 12. *H. corymbosa* (L.) Lam.; fig. 13. *H. pringlei* (Robins.) W. H. Lewis; fig. 14. *H. herbacea* L.; fig. 15. *H. callitrichoides* (Griseb.) W. H. Lewis; fig. 16. *H. watsonii* W. H. Lewis; fig. 17. *H. greenei* (Gray) W. H. Lewis; fig. 18. *H. microtheca* (Schl. & Cham.) Steud. Drawn with the aid of a camera lucida at ×24 reduced by one-half in reproduction.

crotheca, *H. watsonii*, and *H. pringlei* (Robins.) W. H. Lewis are corneous, contrary to the typification of subg. *Oldenlandia*. This feature is at best a generalization with fleshy, intermediate, and corneous endosperms known to each subgenus.

FRUIT. The eastern North American species of subg. *Houstonia* often have capsules one-half or frequently less than one-half inferior. From these first described species, the taxon was sharply separated from its closest relatives and even removed from the Rubiaceae (to the Gentianaceae, DC. Prodr.4: 622, 1830). The study of the southwestern species, in particular *H. arenaria*, *H. asperuloides*, *H. gracilenta*, *H. mucronata* Benth., *H. greenmanii* Fosb., *H. serpyllacea*, and *H. subviscosa* (Wright ex Gray) Shinners, has shown that the subg. *Houstonia* capsules may be entirely or almost entirely inferior, i.e., not more than one-sixth free. Although the subg. *Oldenlandia* capsules are rarely free, the American *H. microtheca* and *H. watsonii* and the African *O. juncoides* Schum. and *O. staelioides* Schum. are not wholly inferior and are indistinguishable from those of the subg. *Houstonia* species mentioned.

FLOWER. At least one American species, *H.* (*Oldenlandia*) *pringlei*, is dimorphic, as are the flowers of *O. affinis* (R. & S.) DC., *O. umbellata* L., *O. verticillata* Bullock ex Brem., *O. somala* Chiov., and *O. eludens* Brem. from Afro-Asia. Perhaps a greater per cent of species in the subg. *Houstonia* possess this characteristic than is known for subg. *Oldenlandia*, but such a tendency has little taxonomic value.

Many Mexican and eastern North American species under subg. *Houstonia* have rather elongate corollas, while the two widely distributed species of subg. *Oldenlandia* in North America, *H. boscii* DC. and *H. uniflora* (L.) Lam., have insignificant, minute corollas. The corollas of *H.* (*Houstonia*) *australis* Lewis & Moore, *H. croftiae* (Britt. & Rusby) Shinners, *H. intricata* Fosb., *H. greenmanii* Fosb., and *H. subviscosa*, however, rarely exceed 2 or 3 mm. in length and are about equal to those of the typical subg. *Oldenlandia* species. In contrast, *H. (Oldenlandia) pringlei* (5-8 mm.) and *H. xestosperma* (Robins. & Greenm.) W. H. Lewis (7-9 mm.)

from Mexico and *O. cryptocarpa* Chiov. (tube, 6 mm.), *O. hymenophylla* Brem. (tube, 7 mm.), and *O. sepaneoides* Schum. (tube, 7 mm.) from Africa have long corollas about equal to the longest in subg. *Houstonia.*

No character currently in use separates the *Houstonia* from the pantropical *Oldenlandia,* and at best only tendencies are expressed. In his revision of the African species, Bremekamp (1952) has chosen, usually with considerable hesitation, to establish genera for those species varying by one or more "key" characters. Although fewer taxa are indigenous to North America, at least 4 additional genera would be required to accommodate those species morphologically between the (artificial) limits established for typical *Houstonia* and the North American *Oldenlandia.* Since the major characteristics of several species exhibit continuous ranges, even this procedure would not place all taxa in definite niches, and for this reason alone, such a generic realignment would ultimately collapse.

On the basis of morphological and the supporting, though incomplete, cytological data (Lewis, 1959), the two genera are merged under *Hedyotis* following Torrey & Gray (1841), Fosberg (1941, 1954), and Shinners (1949). Most taxa have been transferred to *Hedyotis,* but a number of new combinations must be made to complete this transfer for the North American species.

HEDYOTIS subgenus HOUSTONIA (L.) Gray

HEDYOTIS ARENARIA (Rose) W. H. Lewis, comb. nov., based on *Houstonia arenaria* Rose, Contr. U. S. Nat. Herb. **1**: 70, 1890.

HEDYOTIS ASPERULOIDES Benth., f. BRANDEGEANA (Rose) W. H. Lewis, comb. nov., based on *Houstonia brandegeana* Rose, Contr. U. S. Nat. Herb. **1**: 70, 1890. Distinguished from the typical form by its fine, delicate stems and slightly smaller (1-2 mm.) capsules which are ± equal in width and length.

HEDYOTIS BREVIPES (Rose) W. H. Lewis, comb. nov., based on *Houstonia brevipes* Rose, Contr. U. S. Nat. Herb. **1**: 83, 1890.

HEDYOTIS DRYMARIOIDES (Standl.) W. H. Lewis, comb. nov. based on *Houstonia drymarioides* Standl., Jour. Wash. Acad. Sci. **18**: 162, 1928.

HEDYOTIS EXIGUA W. H. Lewis, nom. nov., based on *Houstonia gracilis* T. S. Brandg., Zoe **5**: 238, 1907. Not *Hedyotis gracilis* DC., Prodr. **4**: 419, 1830.

HEDYOTIS GRACILENTA (I. M. Johnst.) W. H. Lewis, comb. nov., based on *Houstonia gracilenta* I. M. Johnst., Proc. Calif. Acad. Sci. IV. **12:** 1174, 1924.

HEDYOTIS LONGIPES (S. Wats.) W. H. Lewis, comb. nov., based on *Houstonia longipes* S. Wats., Proc. Amer. Acad. **18:** 97, 1883.

HEDYOTIS NIGRICANS (Lam.) Fosberg, f. SALINA (Heller) W. H. Lewis, comb. nov., based on *Houstonia salina* Heller, Bot. Expl. S. Tex. (Contrib. Herb. Franklin & Marshall College 1): 96, 1895.

HEDYOTIS PALMERI (Gray) W. H. Lewis, comb. nov., based on *Houstonia palmeri* Gray, Proc. Amer. Acad. **17:** 202, 1882.

HEDYOTIS PENINSULARIS (T. S. Brandg.) W. H. Lewis, comb. nov., based on *Houstonia peninsularis* T. S. Brandg., Zoe **5:** 160, 1903.

HEDYOTIS SAXATILIS W. H. Lewis, nom. nov., based on *Houstonia australis* I. M. Johnst., Univ. Calif. Publ. Bot. **7:** 446, 1922. Not *Hedyotis australis* Lewis & Moore, Southwest. Nat.**3**(1958): 208, 1959.

HEDYOTIS SINALOAE W. H. Lewis, nom. nov., based on *Houstonia parvula* T. S. Brandg., Zoe **5:** 221, 1905. Not *Hedyotis parvula* (Gray) Fosberg, Bull. Bishop Mus., Honolulu, no. **174:** 54, 1943.

HEDYOTIS UMBRATILIS (Robins.) W. H. Lewis, comb. nov., based on *Houstonia umbratilis* Robins., Proc. Amer. Acad. **45:** 401, 1910.

HEDYOTIS VEGRANDIS W. H. Lewis, nom. nov., based on *Houstonia prostrata* T. S. Brandg., Zoe **5:** 105, 1901. Not *Hedyotis prostrata* Korth., Nederl. Kruidk. Arch. II. **2:** 160, 1851.

HEDYOTIS subgenus OLDENLANDIA (L.) Fosberg

HEDYOTIS CALLITRICHOIDES (Griseb.) W. H. Lewis, comb. nov., based on *Oldenlandia callitrichoides* Griseb., Mem. Amer. Acad. II, **8:** 506, 1863.

HEDYOTIS CAPILLIPES (Griseb.) W. H. Lewis, comb. nov., based on *Oldenlandia capillipes* Griseb., Cat. Pl. Cub. 130, 1866. Not *Hedyotis capillipes* Schl. ex Hook. f., Fl. Brit. Ind. **3:** 73, 1880, pro syn.

HEDYOTIS GREENEI (Gray) W. H. Lewis, comb. nov., based on *Oldenlandia greenei* Gray, Proc. Amer. Acad. **19:** 77, 1883.

HEDYOTIS PRINGLEI (Robins.) W. H. Lewis, comb. nov., based on *Oldenlandia pringlei* Robins., Proc. Amer. Acad. **27:** 169, 1892.

HEDYOTIS WATSONII W. H. Lewis, nom. nov., based on *Oldenlandia ovata* S. Wats., Proc. Amer. Acad. **18:** 97, 1883. Not *Hedyotis ovata* Thunb. ex Maxim., Bull. Acad. Petersb. **29:** 161, 1883.

HEDYOTIS XESTOSPERMA (Robins. & Greenm.) W. H. Lewis, comb. nov., based on *Oldenlandia xestosperma* Robins. & Greenm., Proc. Amer. Acad. **32:** 41, 1896. — DEPT. OF BIOLOGY, STEPHEN F. AUSTIN STATE COLLEGE, NACOGDOCHES, TEXAS.

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DRABA APRICA IN OKLAHOMA

REED C. ROLLINS

It is often said among botanists that rare plants receive an unwarranted amount of attention and by and large this appears to be true. Some of the stimulus for this is to be associated with the attraction of novelty for its own sake but I am convinced that a real desire to make rarities more generally known or to clear up doubtful information is often basic to the attention given. A case in point as to the latter has to do with *Draba aprica* Beadle. This little annual crucifer was first discovered by Thomas Nuttall in Arkansas in 1819 and later published for Nuttall by Torrey and Gray (1838) as *Draba brachycarpa* Nutt. *β fastigiata* Nutt. The same plant was found on Kenesaw Mt., near Marietta, Georgia, and described for Beadle by Small (1913) as *D. aprica* without reference to the earlier varietal name of Nuttall.

When Fernald (1934) was working on *Draba* in the early 1930's, he stimulated L. M. Perry to search for this species on Kenesaw Mt., since it had not been recollected in the in-

tervening years. The results were two collections by Perry and Myers in May, 1934. In his writeup of *D. aprica,* Fernald (l.c.) raised the question as to whether *D. brachycarpa* var. *fastigiata* and *D. aprica* were one and the same thing. The problem at that time also involved the question as to whether the material of Nuttall described as var. *fastigiata* really came for Arkansas or was an inadvertent mixture, on the same sheet at the New York Botanical Garden, of Georgia material from other collections. Fernald assumed that the specimen at New York is the type (holotype) of *D. brachycarpa* and that the type (holotype) of var. *fastigiata* is on the same sheet. Just to put the record straight in one respect, the holotype of *D. brachycarpa* is at the British Museum. A photograph of it and an isotype are in the Gray Herbarium. The holotype of *D. brachycarpa* var. *fastigiata* should also be at the British Museum but I was unable to find it there on one of my visits. Perhaps the New York specimens are, in fact, the holotype in the latter case. Although he was wrong about the actual location of the holotype of *D. brachycarpa,* Fernald did call attention to the need of a search for *D. aprica* (*D. brachycarpa* var. *fastigiata*) in Arkansas to clear up the confusion as to the area of origin of Nuttall's material.

Steyermark (1940) came through with the discovery of *Draba aprica* in the Ozarks of southeastern Missouri, demonstrating that the species still occurs in territory at least adjacent to that of Nuttall's travels. If any doubt remains that the plant might occur where Nuttall went on his famous excursion up the Arkansas River, it should be completely dispelled by a collection made by Kenton Chambers and me in 1957. We had stopped a few miles north of Broken Bow in extreme southeastern Oklahoma to try for cytological material of the then recently described *Streptanthus squamiformis* Goodman (1956). In the same area with the *Streptanthus* on an open knoll sparsely covered with dwarfed oaks and pines, we found more than a dozen plants of *Draba aprica.* In the collection (*Rollins and Chambers 5762,* 3.7 miles north of Broken Bow, McCurtain Co., Oklahoma,

April 13, 1957; GH), we inadvertently included two plants of *D. brachycarpa.* Our collecting experience with these two species was similar to that of Nuttall, who one hundred and thirty-eight years earlier had mixed the two species in a collection that was primarily *D. brachycarpa*, with only a few plants of *D. aprica* included. Steyermark (l. c.) similarly found *D. brachycarpa* and *D. aprica* growing at the same site. Aside from showing that *D. aprica* is to be included in the Oklahoma flora, our collection is notable in that it is the only one since Nuttall's day from the area where he originally found it.

Hitchcock (1941) has suggested that *Draba aprica* is indeed only a variety of *D. brachycarpa*, as originally proposed by Nuttall and published by Torrey and Gray. However, I disagree with this conclusion. The larger and fewer seeds; the more elongate, densely pubescent instead of glabrous siliques; the characteristic shortened branches and condensed infructescences; and the dentritic instead of cruciform trichomes of the leaf-surfaces are all distinctive features of *D. aprica.* A further suggestion that *D. aprica* might be a polyploid form because of the larger fruits and seeds seems unwarranted in view of the fact that the trichomes are much smaller than in *D. brachycarpa* and might with the same justification be interpreted as evidence for the opposite viewpoint. — GRAY HERBARIUM OF HARVARD UNIVERSITY.

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GISEKIA PHARNACIOIDES, A NEW WEED

R. K. GODFREY[1]

The loose recently tilled sandy soils of a number of orange groves in Orange County, central peninsular Florida, are presently inhabited by large numbers of plants of *Gisekia pharnacioides* L. (Phytolaccaceae). This is an Old World annual plant much resembling *Mollugo verticillata* L. in habit and certain superficial characteristics. It has not been previously reported as a naturalized introduction to this continent and I have no information as to when it first appeared or by what means it was introduced. I first saw the plant in a single orange grove in the summer of 1958. Later in that year Professor Erdman West, University of Florida, Gainesville, told me that a plant of this species had recently been sent to him for identification from an orange grove in the vicinity of Lake Alfred, Polk County, Florida. Travelling through central Florida in the summer of 1961, I saw it in numerous orange groves in the general vicinity of my first collection, between Oakland in Orange County and the Oceola County line, but did not see it elsewhere.

Although this weed appears to flourish in cultivated, loose sands much as do *Mollugo verticillata, Diodia teres* Walt., and other annuals, it would not appear to be any more of a problem agriculturally than are other such ubiquitous weeds.

There are several species of *Gisekia* which occur in different parts of the Old World. Specimens of our plants were sent to Dr. Carroll E. Wood, Jr., Harvard University, who very kindly compared them with specimens at the Gray Herbarium. He said that ours best matched specimens of *Gisekia pharnacioides* from India.

Citations for my specimens are: Orange County, Florida: locally abundant in an orange grove, 5 miles south of Oakland, Aug. 8, 1958, *Godfrey 57373;* abundant, loose sandy soil, orange grove, 3 miles north of jct. Fla. Rt. 530 and 545, south of Oakland, *Godfrey and Reinert 61029.*

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Gisekia pharnacioides is a somewhat succulent, glabrous annual with several subequal prostrate principal branches spreading radially from the base. The leaves are opposite, the branching is opposite except as one of the two laterals may fail to develop. Leaves short-petioled, narrowly lanceolate, elliptic-lanceolate, or linear-oblong, entire; midvein

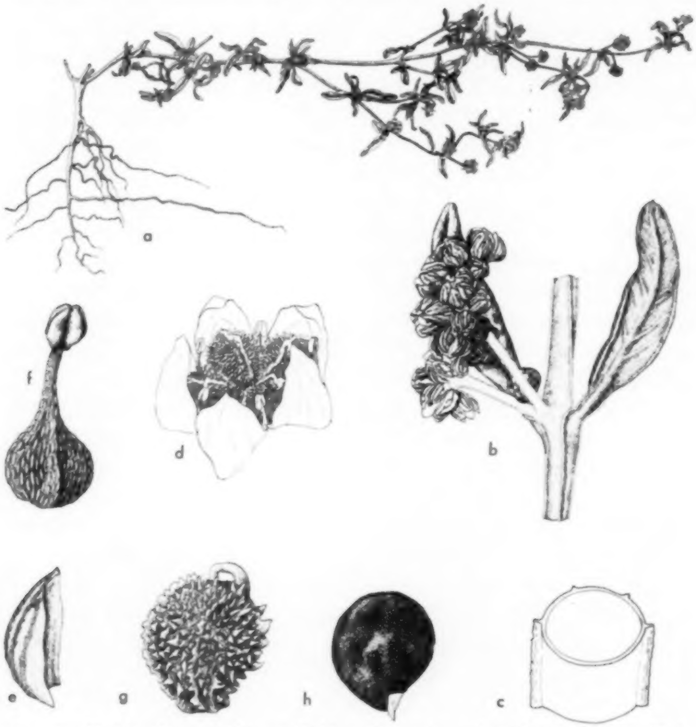

FIG. 1. *Gisekia pharnacioides*. a. Habit, all except one branch removed. b. Node with an axillary dichasium. c. Outline of cross-section of stem. d. Flower. e. Sepal. f. Stamen. g. Ovulary. h. Seed.

prominent below, depressed above, lateral veins scarcely evident; upper leaf surface deep green, finely punctate, the lower pale green, somewhat roughly granular-punctate; lowermost margins of the blades with translucent band-like edges which are decurrent on the petiole thence across the

swollen nodes and finally decurrent along the stem as narrow pebbly ribs to the next node. The stem body is essentially terete aside from the four ribs which are more or less obscured in drying; between the ribs lesser striae are sometimes evident. The stems are reddish in color.

Inflorescences are axillary dichasia and are produced more or less throughout the branches, the terminus of each major branch ending in a dichasium. In a given axil, the dichasium consists of a solitary short-stalked central flower with two lateral compact, compound, stalked dichasia, the stalks up to 1-2 cm. long but frequently very unequal in length. Each of the laterals is subtended by a subulate bract.

Individual flowers are small, about 2 mm. long. The calyx is comprised of five boat-like sepals, white-hyaline along their lower margins, and pink-hyaline at their obtuse tips. No corolla is present. Stamens five, alternating with the sepals and about equalling them in length, the filaments translucent, much dilated at the base and abruptly narrowed upward, the anthers white. Carpels five, free, flattened, oblique relative to positions of attachment and of the stigma, but nearly circular in outline; carpel wall thin, translucent or almost transparent but densely clothed with white, thickish, spicule-like, but soft protuberances, somewhat erose-winged along the flattened margins. Style soft and flat, short, arising obliquely and incurving over the summit of the ovulary, stigmatic at the tip. Ovules one in each carpel. In fruit, the ovulary wall is thin and virtually transparent but the dried protuberances of its surface make it appear coarsely granular. The seed is oblique-lenticular, nearly circular in outline, very dark brown or black, its surface lustrous and finely punctate, so closely enveloped by the thin ovulary wall that it shows through.

Individual plants vary greatly in size as is characteristic of many kinds of annuals. Where they grow very thickly, individuals are small, the branches tending to be ascending. Isolated plants are in general much more vigorous, have branches 6-8 dm. long, perhaps more, and are definitely prostrate. — DEPARTMENT OF BIOLOGICAL SCIENCES, FLORIDA STATE UNIVERSITY, TALLAHASSEE.

HETEROSTYLY AND HOMOSTYLY IN LITHOSPERMUM CANESCENS (BORAGINACEAE)

H. G. Baker

In the Boraginaceae, heterostyly of the distylous type was first investigated experimentally by Hildebrand (1864, 1865) and Darwin (1877) who both worked with species of *Pulmonaria*. Its occurrence in the family, however, had been noticed earlier by Torrey (1856), especially in *Amsinckia*, and Gray (1859) records it for *Lithospermum*. Much more recently, Johnston (1952), in his taxonomic survey of *Lithospermum*, took care to distinguish heterostylous from homostylous species and used the distinction in his key for their identification. However, no experimental work has been done on this genus so that our knowledge of the population biology of its species is still at a primitive level. Therefore, it is of interest that two works published by nineteenth century botanists dealing with heterostyly in *Lithospermum canescens* (Michx.) Lehm., one of the showy North American species, appear to have remained unknown to twentieth century writers on the genus even though they contain items of considerable moment.

The first of these neglected works is by Erwin Smith (1879). This is of more than merely historical interest because it also records the existence of homostylous plants of *L. canescens* amongst the plants which he collected in Michigan. In Johnston's recent treatment, *L. canescens* was considered to be exclusively heterostylous and, indeed, no other species of the genus has been recorded as containing indisputably heterostylous and homostylous plants. This need not be surprising for Baker (1960) has given reasons for believing that speciation is likely to follow quickly after a change in breeding system (and heterostyly promotes allogamy while derived homostyly is generally associated with a greatly increased proportion of autogamous seed-production).

Translating Smith's remarks on proportions into percentages, it would seem that roughly 59% of the plants

which he saw were short-styled (with stamens inserted at the mouth of the corolla-tube) while only 39% were long-styled. In the long-styled plants the length of the style varied from being included within the corolla-tube to being conspicuously exserted, an appearance which could result from the sampling of flowers of different ages should there be a differential elongation of corolla-tube and style during maturation of the flower. The remaining 2% of plants would be classified nowadays as "short-homostyles". Even these showed some variability, the anthers standing either at the level of the stigmas or just above them. Particularly striking, however, was a tiny proportion of homostylous plants in which the stamens are inserted at two levels, two of them above the stigma and three on a level with it.

The accuracy of such an observation is testified to by the subsequent description of an unequal (or zonal) insertion of stamens by Johnston (1952) in *Lithospermum tournefortii* Johnston (heterostylous) and *L. decumbens* Vent. (probably homostylous), as well as in several other genera of the Boraginaceae. However, it is in the published accounts of the floral structure of *Amsinckia lunaris* Macbr. (Macbride, 1917; Suksdorf, 1931; Ray and Chisaki, 1957) that the closest parallel may be seen. Here, probably as in *Lithospermum canescens,* a heterostylous species has produced a homostylous variant in which the stamens are inserted at two levels, one of them corresponding with the height of the stigma and almost certainly leading to a high proportion of self-pollination. In *Amsinckia lunaris,* according to Ray and Chisaki, the pollen grains from the two lower anthers are smaller than those from the upper trio (which may function in cross-pollination). It would be most interesting to know if a similar situation obtains in the unusual plants of *Lithospermum canescens.*

In view of this report of homostylous plants of *L. canescens* from Michigan, a survey was made of the floral structure of specimens from a variety of States in the herbaria at the University of California, Berkeley, and at

Stanford University. Also Dr. Paul Grun and Dr. R. B. Channell kindly made observations on material at Pennsylvania State and Vanderbilt Universities, respectively. Unfortunately, no homostylous specimens were found. Overall, however, 39 short-styled plants were observed along with 24 long-styled. This preponderance of short-styled plants tallies with Smith's (1879) observation from Michigan. If field-studies should show this to be a regular feature of naturally occurring material, it might be interpreted most reasonably as indicating that some self-pollination occurs (otherwise the two forms might be expected to occur in roughly equal numbers). A preponderance of short-styled plants could be produced if this type is self-pollinated considerably more frequently than is the case with the long-styled form, through pollen falling down the corolla-tube. Another possible cause of such a disparity in numbers, although of lesser likelihood, would be that both forms are selfed with roughly equal frequency but that the allele producing the long-styled condition is the genetical dominant. On selfing the heterozygous form produces both kinds in its progeny while the homozygous recessive form produces all recessives, creating an excess of this form. However, in almost all cases where the genetics of a distylous system is known it is the short-styled form which is genetically dominant (cf. Lewis, 1954). Only in the Plumbaginaceae is there good reason to believe that the opposite is true (Baker, 1954 and unpub.), and preliminary results for the Boraginaceae from the genus *Amsinckia* (Ray and Chisaki, 1957), as well as a modern interpretation of Darwin's (1877) results with *Pulmonaria*, both suggest a contrary situation; that the short-styled condition is dominant.

Another, apparently unique, feature of heterostyly in *Lithospermum* in a difference in *shape* between the pollen of long-styled and short styled plants. To Johnston (1952), his discovery of this shape-difference correlated with heterostyly demonstrated "a type of pollen dimorphism previously unreported." However, in 1880, in the second of these neglected papers, C. E. Bessey described heterostyly in material of *L. canescens* from central Iowa and included not only

statistics on the sizes of the pollen grains of the two kinds of plants but also these comments on their shapes, "pollen grains ovoidal, slightly constricted in the middle" (on short-styled plants) and "pollen grains oblong, much constricted in the middle" (on the long-styled plants). The descriptions accord quite well with Johnston's more detailed observations made three-quarters of a century later.

This overlooked, earlier description of pollen shape differences associated with heterostyly recalls that dimorphism in sculpturing of the grains was described as a part of flower dimorphism in the Plumbaginaceae by Macleod in 1887, but that this lay unused until Kulczyński (1932) applied it to the identification of fossil pollen. Actually, neither Bessey's nor Macleod's description of pollen dimorphism was the first report of such a phenomenon, for it had been seen in the Rubiaceae as early as 1868 by F. Müller (1869), the significance of this demonstration remaining unnoticed until recently (Baker, 1956).

In fact, Bessey's short paper was more concerned with a description of the variable relationship between stamen and style lengths in another species, *Lithospermum longiflorum* Pursh (which is now considered synonymous with *L. incisum* Lehm.). In this species, Bessey considered that heterostyly might be in process of development. However, in view of its production of cleistogamic flowers on a regular seasonal basis, it seems more likely that his alternative suggestion, that this is a species which has moved toward inbreeding rather than away from it, is the correct one.

However, had Bessey made his observations just a few years sooner, it is unlikely that they would have been relegated to the obscurity which has been their fate. On May 22, 1877, Asa Gray wrote to Charles Darwin saying, "I asked my good correspondent Prof. Bessey to see if *Lithospermum longiflorum (= angustifolium)* being cleistogamous later, is, like its relatives, also dimorphous. Here is his first reply just in season to send you by this post. I forgot to ask him to examine *pollen.* I will do so" (unpub. let-

ter in Gray Herbarium, quoted from microfilm copies kindly lent by Dr. Hunter Dupree).

Darwin replied on June 4, 1877, in a letter which, because it does not mention the genus involved, has always been a mystery (cf. transcript in Holbrook, 1939). Now, we can see that it was to *Lithospermum incisum* that Darwin was referring when he wrote, "Prof. Bessey's case has come too late, as the sheets on this subject are printed .... The pollen grains and stigmas ought to be compared. The case seems to be well worth careful investigation and I would have given my eyes for seeds formerly; but now I have done with the subject." He went on to give instructions for Bessey on methods of observation and experimentation and point out that, "the case may be one merely of great variability or it may be one of incipient heterostylism." Bessey appears to have given some heed to the instructions because his paper did not appear till three years later. Meanwhile, Darwin (1877) had published the famous book to which he was making reference in his letter — "The Different Forms of Flowers on Plants of the Same Species."

Surprisingly, Asa Gray, himself, never made a clear statement on dimorphism in *L. canescens.* In the "Synoptical Flora of North America" (Gray, 1878, and subsequent editions) his sole comment reads, ". . . in one form style about the length of the tube and stamens, inserted below its middle." Even with the deletion of the comma, one is merely left to infer the existence and appearance of a second form.

Knuth (1899, page 120; in translation 1909, page 137) added to the camouflage of Bessey's discovery by giving an erroneous reference in the statement, "Darwin describes the flowers of this species [*L. canescens*] as either heterostylous or very variable in regard to the length of the style." Actually, Darwin never described the heterostylism of any species of *Lithospermum* and, in all probability, the statement should have referred to Bessey and to *L. incisum*! Similarly, Knuth credits Darwin with a de-

scription of cleistogamous flowers in *L. incisum* (Knuth, 1899, page 120, as *L. longiflorum* Pursh; in translation 1909, page 137, as *L. angustifolium* Michx.). Once again the credit should have been Bessey's. On another page, however, although rather inconspicuously, the same author does give Bessey credit for having seen heterostyly in *L. canescens* (Knuth, 1898, page 62; in translation 1906, page 50).

Thus, despite a history of confusion and neglect lasting for the larger part of a century, the reproductive biology of *Lithospermum canescens* is commended to the attention of field-botanists and experimentalists living within its geographical range in the eastern half of North America. This species promises to reward the student of natural populations through variations in the proportions of the various flower-forms and the genetical studies which these may make feasible. — BOTANY DEPARTMENT, UNIVERSITY OF CALIFORNIA, BERKELEY, CALIFORNIA.

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A NEW SPECIES OF PANICUM FROM NEW JERSEY

JASON R. SWALLEN

A specimen of *Panicum* was received recently for identification from Bayard Long of the Academy of Natural Sciences of Philadelphia, which has proven to be new. It was collected by Frank Hirst, an active amateur botanist in southern New Jersey, who recognized it as an unusual plant, and in whose honor the species is named. "It occurs dominantly in a small woodland pond in the pine barrens — growing in the water, much as Panicum spretum often does. This is a most interesting pond, the Panicum being

associated with Lobelia boykinii, Paspalum dissectum, Coreopsis rosea, etc."

Panicum hirstii Swallen, sp. nov.

Culmi 55-80 cm. alti, ramosi, glabri; ligula brevis, ciliata; laminae acuminatae, adscendentes, usque ad 11 cm. longae, 3-5.5 mm. latae, glabrae; panicula angustissima, usque ad 9 cm. longa; spiculae 1.8-2.1 mm. longae, glabrae; gluma prima obtusa enervis.

Culms 55-80 cm. tall, erect or ascending, glabrous; sheaths mostly shorter than the internodes, glabrous or sparsely pilose on the margins near the summit, the uppermost usually elongate; ligule a dense line of hairs, 0.5 mm. long; blades stiffly erect or narrowly ascending, 4.5-11 cm. long, 3-5.5 mm. wide, flat, acuminate, glabrous, often tinged with purple; panicles 4.5-9 cm. long, about 5 mm. wide, the branches as much as 2.5 cm. long, appressed, smooth or scaberulous; spikelets 1.8-2.1 mm. long, glabrous, the pedicels appressed, usually a little shorter than the spikelets; first glume broadly obtuse, nerveless, 0.5-0.8 mm. long; second glume and sterile lemma with hyaline margins, the lemma cucculate, subacute, as long as the fruit, the glume broadly obtuse, a little shorter than the fruit; fruit subacute, obscurely roughened, pale or yellowish. Autumnal phase sparingly branching from most of the nodes, the leaves and panicles not much reduced.

Type in the U. S. National Herbarium No. 2,306,491, collected in Leipzig Ave. Pond, Germania, Atlantic Co., New Jersey, June 7, 1959, by Frank Hirst (No. 47).

Additional material examined: NEW JERSEY: In water of small woodland pond, pine barrens, in Galloway Township, southeast of Egg Harbor City (this is the same locality as the one where the type was collected, fide Bayard Long), August 11, 1959, *Bayard Long 85320.* GEORGIA: Margin of pine-barren pond, Sumter County, August 23, 1900, *Roland M. Harper 458;* Cypress swamp, 1 mile north of Leary, Calhoun County, May 31, 1947, *Robert H. Thorne 4313.*

Harper 458 was doubtfully referred to *Panicum roanokense* Ashe by Hitchcock and Chase in their revision of *Panicum* (Contr. U. S. Nat. Herb. **15**: 197. 1910). *P. hirstii* is readily distinguished from *P. roanokense,* however, by the very narrow panicles with relatively short-pedicelled spikelets, the shorter second glume, and the sparingly branching culms, the autumnal blades and panicles scarcely reduced. — DEPARTMENT OF BOTANY, U. S. NATIONAL MUSEUM, SMITHSONIAN INSTITUTION, WASHINGTON, D. C.

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